X-38 By The Numbers

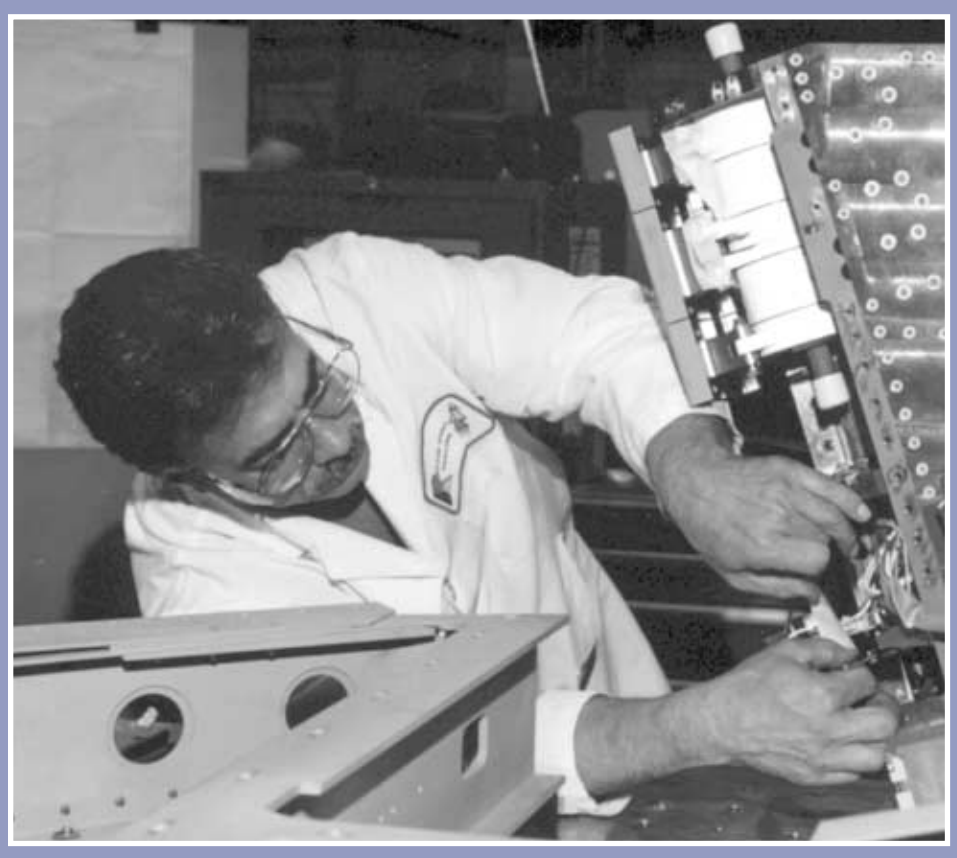
Length:	**30 feet**
Width:	**14.5 feet**
Cabin:	**438 cubic feet**
Mass:	**25,000 pounds**
Crew size:	**7**
Mission duration:	**Up to 3 years**
Launch time:	**As low as 3 minutes**

Deorbit Propulsion System

Length:	**6 feet**
Width:	**15.5 feet**
Mass:	**6,000 pounds**

Parafoil

Area:	**7,500 square feet**
Span:	**143 feet**
Deploy altitude:	**23,000 feet**



X-38 Technology:

Expanding the Envelope of Spacecraft Design

Electromechanical Actuators Small electric motors that weigh only 10 pounds — yet are powerful enough to move with five tons of force in a fraction of a second — replace complicated conventional hydraulic systems to power the X-38's flaps and rudders. Hydraulic systems account for up to 25 percent of the annual maintenance on commercial aircraft, and the electrical actuators on the X-38 serve as a forerunner for a technology that has the potential to make flight simpler and safer not only in space but also on Earth.

Laser-Initiated Pyrotechnics Never before used on a human spacecraft, the explosive charges that deploy the X-38's parachutes are fired using a system of fiber optics and lasers. Using light instead of electricity simplifies the system and reduces the potential for interference during the extended stays the X-38 will experience in orbit.

Landing Skids Rather than temperature-sensitive tires, the X-38 uses simple skids as landing gear, eliminating the need to watch inflation pressures, brakes, or other complex mechanisms during the years it spends in space.

Navigation The X-38 uses compact Global Positioning System and electronics technology for its primary navigation system — never before used as the primary navigation equipment on a human spacecraft. The GPS navigation system designed for the X-38 already has been flight-tested as a payload aboard the shuttle.

Lifting Body The X-38's special lifting body shape — a shape that creates lift so the craft can fly even though it has no wings — is a modified version of a shape tested by the Air Force in the late 1960s and early 1970s. The Air Force's previous testing has reduced the costs associated with the X-38. The lifting body shape gives the X-38 the capability to fly to a landing site during its descent, increasing the number of possible landing sites. Two movable fins and body flaps provide steering for the spacecraft as it descends into the atmosphere. The shape is compact enough to fit within the shuttle's payload bay for launch, but it is still large enough to hold a crew of seven.

Parafoil A 7,500-square-foot parafoil, the world's largest, allows the X-38 to have great flexibility to get a crew back to Earth quickly with dozens of potential landing sites available around the world, eliminating the need for a miles-long runway to accommodate high-speed landings similar to the space shuttle. Using the parafoil to glide to its final descent, the X-38 touches down at under 40 miles per hour and skids to a stop in only 150 feet. The giant X-38 parafoil, almost one and a half times as large as the wings of a 747 jumbo jet, may be a technology that finds other uses, on future spacecraft as well as on Earth for any need that requires precise landings, such as airdrops of humanitarian aid.

Life Support For reliability, the X-38's life support system uses proven, simple technologies: Lithium batteries already used on many shuttle-deployed satellites provide electricity. Active cooling of the cabin and electronics is provided by a sublimator technology first used on the Apollo lunar lander. Carbon dioxide is scrubbed from the cabin air using lithium hydroxide canisters that have operated virtually problem-free on all human spacecraft. The fire extinguishing system uses technology commonly found on advanced fighter aircraft. And the communications system is identical to technologies used on most NASA satellites. As a custom-built rescue craft, the X-38 can provide a normal sea-level pressure atmosphere for seven crewmembers for at least nine hours, twice as long as is required for a worst-case return to Earth.

Crew Cabin The station "lifeboat" will hold a crew of seven — the entire crew of the space station, ensuring no one is left behind in an emergency — and be capable of returning them to Earth automatically. The crew will be able to take over manual control of some functions, such as selecting a landing site and steering the parafoil during final descent. The crew will land in a supine position and be subjected to minimal forces during landing to protect any member that may be sick, injured or deconditioned from long exposure to weightlessness. The crewmembers can monitor the operation of an X-38 rescue vehicle and manually take over functions using color display screens and controls. The cabin is windowless; exterior views are provided to the crew by television cameras.

X-38 Operations Timeline Calendar

March 8, 2001
Entry Simulation 2 for Vehicle 201
JSC Mission Control Center, Houston, TX

March 13, 2001
7500-Square-Foot Parafoil Drop Test
Yuma Army Proving Grounds, Yuma, Az

April 5, 2001
Vehicle 201 Structures Test (13 weeks)
July 4, 2001
Building 13, JSC, Houston, TX

April 5, 2001
Free Flight 2 of Vehicle 131R
Dryden Flight Research Center
Edwards Air Force Base, CA

April 19, 2001
Entry Simulation 3 for Vehicle 201
JSC Mission Control Center, Houston, TX

June 6, 2001
Free Flight 3 of Vehicle 131R
Dryden Flight Research Center
Edwards Air Force Base, CA

July 18, 2001
7500-Square-Foot Parafoil Drop Test
San Nicholas Island, CA

August 13, 2001
Vehicle 201 Modal Test (5 weeks)
September 14, 2001
2001 Building 13, JSC, Houston, TX

August 23, 2001
Free Flight 4 of Vehicle 131R
Dryden Flight Research Center
Edwards Air Force Base, CA

October 16, 2001
7500-Square-Foot Parafoil Drop Test
Yuma Army Proving Grounds, Yuma, AZ

October 23, 2001
7500-Square-Foot Parafoil Drop Test
San Nicholas Island, CA

November 5, 2001
Vehicle 201 EMI Test (1 week)
November 16, 2001
Building 14, JSC, Houston, TX

November 19, 2001
Vehicle 201 Free Modal Test (8 weeks)
January 11, 2002
Building 13, JSC, Houston, TX

December 6, 2001
Free Flight 5 of Vehicle 131R
San Nicholas Island, CA

January 28, 2002
Vehicle 201 Acoustic Test (5 weeks)
March 01, 2002
Building 49, JSC, Houston, TX

February 21, 2002
Transonic Free Flight 6 of Vehicle 131R
Dryden Flight Research Center,
Edwards Air Force Base, CA

March 4, 2002
Vehicle 201 Thermal/Vacuum Test (3 weeks)
March 22, 2002
Building 32, JSC, Houston, TX

March 27, 2002
Ship Vehicle 201 to KSC
Kennedy Space Center, FL

August 15, 2002
Space Flight of Vehicle 201 Aboard
STS-118 (*Columbia*)
February 03, 2003
Kennedy Space Center, FL